

# Feed-in-Tariff (FiT) Concept to Promote the Usage of Renewable Energy in Malaysia

A. Johari<sup>1</sup>, S. SitiHafshar<sup>\*2</sup>, H. Hashim<sup>3</sup> and M. Ramli<sup>4</sup>

Department of Chemical Engineering, Faculty of Chemical Engineering

Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia

<sup>1</sup>anwar@cheme.utm.my; <sup>\*2</sup>sitihafsharsamseh@yahoo.com; <sup>3</sup>haslenda@cheme.utm.my; <sup>4</sup>ramli@cheme.utm.my

## Abstract

Energy is essential in our life. Energy sources in Malaysia are heavily dependent on fossil fuels. Today, Malaysia starts to realize the importance to adopt renewable energy (RE) in the energy mix to ensure sustainable energy and security. This paper aims to present and discuss the feed-in tariff (FiT) outlook in Malaysia, which is enacted under Renewable Energy Policy by the Malaysian Government. The overall approach of how FiT mechanism works towards the RE and how to benefit from it was discussed. The FiT implementation globally is positive indicators to implement FiT in Malaysia. Potentials of FiT on RE are currently very promising in Malaysia and able to give opportunities to public in generation of energy from RE. In terms of cost, solar energy (solar photovoltaic) predicted to be the main RE of the future, surpasses all other REs.

## Keywords

*Renewable Energy; Sustainable Energy; Feed-in-tariff; Energy Policy*

## Introduction

Energy has become the most important issue for the development of economy and social growth in Malaysia. Presently, the country's source of energy is largely met by fossil fuels. With the rising trend of fuel prices in the world market, the government has looked into the potential of renewable energy (RE) from the sources of solar, biogas/landfill, biomass/solid waste or hydro as another alternative to ensure the sustainability of energy resources and energy security. In the effort to ensure energy security and promote sustainable environment in the country, the Ministry of Energy, Green Technology and Water launched National Renewable Energy Policy and Action Plan (NREPAP) have passed RE Act and SEDA Malaysia Act (Sustainable Energy Development Authority of Malaysia) in April 2011, which is meant to boost RE market and reduce dependency on fossil fuels in energy generation. Therefore, Feed-in-Tariff (FiT)

program was implemented under this act as a means to encourage the generation of RE in the country and to achieve sustainable environment.

## Feed-in-Tariff (FiT)

FiT mechanism is expected to create significant increase of RE usage in developing and developed countries. However, FiT requires support from law enforcement created by government. Currently, FiT mechanism is the most successful policy to simulate the rapid development of RE in the country, which is because FiT has been established with simple structure and actively involves general public in generation of their own RE that enables the country to achieve a sustainable environment in long term.

Under the SEDA Malaysia Act 2011, SEDA Malaysia as a statutory body has been established to implement the objectives of the NREPAP. The functions of SEDA Malaysia is to promote, manage and monitor the progress of RE through FiT Program.

FiT is a mechanism that allows electricity generated from renewable resources to be sold for power utilities at a fixed premium price at a specific duration. In general, FiT is a payments per kilowatt-hour (RM/kWh) for electricity produced from renewable resources.

In FiT, individuals or businesses that hold a feed-in approval issued by SEDA Malaysia shall be known as "feed-in approval holder". RE generator plants for feed-in approval holder will be linked directly to the national grid to provide clean electricity. The natural RE (in kWh) generated by feed-in approval holders will be sold at a fixed premium price (FiT Rate) to "distribution licensee" or the holder of the licence to distribute the electricity.

The Fit Rate is effective and fixed for a specific period as stated in Renewable Energy Power Purchase

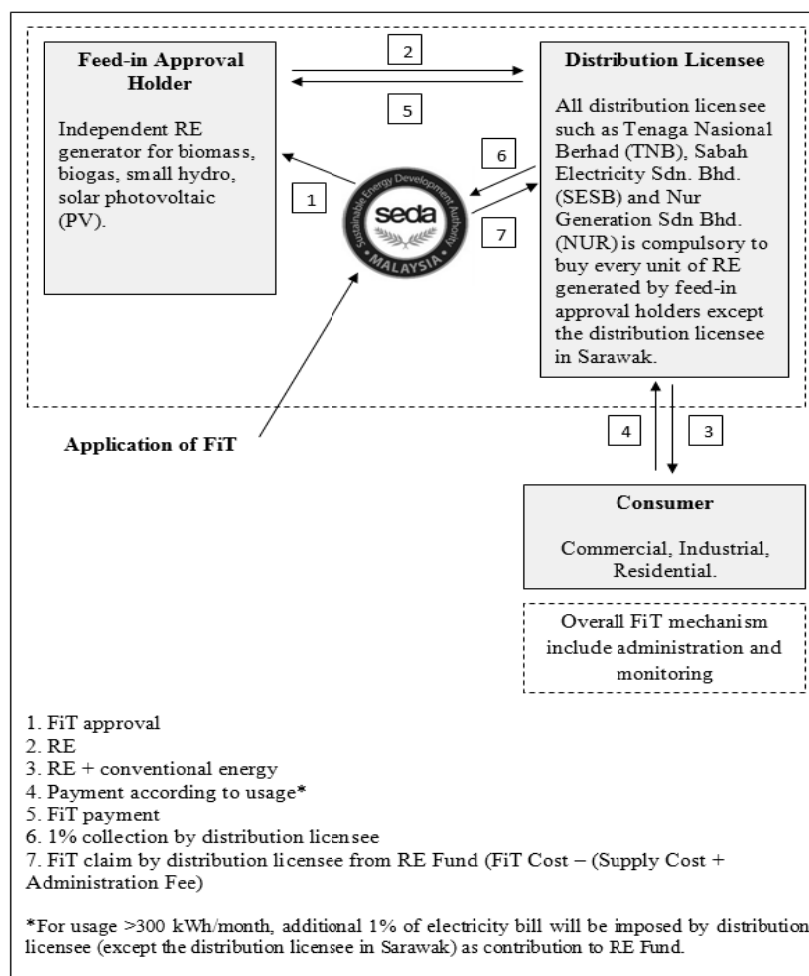


FIG. 1 FIT MECHANISM, (KETTHA,2011)

Agreement (REPPA) which is an agreement between a distribution licensee and feed-in approval holder (Law of Malaysia, 2011). Under the RE Act 2011, the distribution licensee is compulsory to buy every single unit of RE generated by feed-in approval holders to ensure that the investment is guaranteed. Figure 1 indicates how the FiT concept works.

TABLE 1 FiT RATE FOR RE, (KETTHA, 2011)

	FiT Rate (RM per kWh)*	Effective period	Initial Annual Degression Rate	RE Quota until year 2012 (MW)
Solar Photovoltaic (PV)	0.85 – 1.78	21 years	8 %	50
Biogas	0.28 – 0.35	16 years	0.5 %	20
Biogas Sewage	0.38 – 0.43	16 years	1.8 %	10
Biomass	0.27 – 0.35	16 years	0.5 %	60
Biomass Waste	0.37 – 0.45	16 years	1.8 %	20
Small Hydro	0.23 – 0.24	21 years	0 %	30

\*FiT rate range is depend on the capacity of RE installation and bonus incentives that qualified to be accepted.

The FiT's rate given to feed-in approval holder is different, depending on the types of RE technology used and capital investment involved in RE technology installation. Generally, the technology selected under FiT is a technology with proven potential on local environment. Table 1 lists the FiT rate, REPPA period (effective period), degression rate and RE quota for the year 2011-2012.

The FiT payments given to feed-in approval holder as income for electricity generation from RE sources are funded by RE Fund whose income achieved from the collection of 1% by distribution licensee to all electric users who uses electricity exceeding 300 kWh (equivalent to RM77) per month should contribute to 1% from their total electricity bill to distribution licensee as income for electricity generation from RE sources (KETTHA, 2011). In other word, RM1 goes to RE for every RM100 per month, which will not affect low income consumers as they consume less than 300 kWh per month (Haris, 2010). The collection of 1% by distribution licensee has started effectively from 1st

December 2011. To ensure RE Fund management is well implemented, distribution licensee is responsible to make all FiT payments to feed-in approval holder in every month and distribution licensee will only make any claim from RE Fund if there is a positive difference between FiT payment, supply cost and administration fee. Figure 2 shows electricity bill with collection of 1% by TNB (distribution licensee) to the electricity users who use electricity exceeding 300 kWh whilst Figure 3 shows electricity charge to consumers that consume less than 300 kWh per month.

ELECTRICITY BILL				
ACCOUNT NUMBER	CONTRACT	TARIFF	TOTAL DEPOSITS	BILL NUM.
0345 00618541 07	00000779	013	180.00	15065751
XXXX XXXX XXXX XX XXX XXXX XXX XXXXXXXX XX XXX XXXX XXXX XXXX XXXX XXXXXXX XXXX		(080 - 060733) 0 RU 00000568		
CHARGE	UNIT	RATE	TOTAL	
BLOCK OF ELECTRIC USE	213	0.218	RM	46.42
	107	0.334	RM	35.74
	107	0.400	RM	42.82
	107	0.402	RM	43.01
	107	0.416	RM	44.51
	107	0.426	RM	45.58
	66	0.437	RM	28.84
RENEWABLE ENERGY FUND			RM	2.87
CURRENT MONTH BIL TOTAL			RM	289.78

FIG. 2 ELECTRICITY BILL WITH COLLECTION OF 1% BY TNB

ELECTRICITY BILL				
ACCOUNT NUMBER	CONTRACT	TARIFF	TOTAL DEPOSITS	BILL NUM.
0345 00618541 07	00000779	013	180.00	15065751
XXXX XXXX XXXX XX XXX XXXX XXX XXXXXXXX XX XXX XXXX XXXX XXXX XXXX XXXXXXX XXXX		(080 - 060733) 0 RU 00000568		
CHARGE	UNIT	RATE	TOTAL	
BLOCK OF ELECTRIC USE	200.00	0.218	RM	43.50
BLOCK OF ELECTRIC USE	33.00	0.334	RM	11.82
CURRENT MONTH BIL TOTAL	:		RM	54.52

FIG. 3 ELECTRICITY BILL FOR CONSUMERS THAT CONSUME LESS THAN 300 KWH PER MONTH

Degression rate on RE is different in each year. The basis of the degression rate is the cost of RE technology which decreases when the RE industry becomes more matured with increase of feed-in approval holder participation in year onwards. The FiT rate prescribed under REPPA is guaranteed during agreement term and is not subjected to any reduction. At the same time, the quota for RE is based on RE Fund available and given on a first-come-first serve basis. Table 2 lists estimated RE quota for 10 years

TABLE 2 RE QUOTA IN MALAYSIA (MW PER YEAR), (Paul Gipe, 2011)

Year	Solar PV	Biogas	Biogas Sewage	Biomass	Biomass Waste	Small Hydro	Annual Total	Cumulative MW
2011	29	20	5	90	15	60	219	219
2012	50	20	10	60	20	30	190	409
2013	63	15	10	60	30	60	238	647
2014	95	25	10	60	40	60	290	937
2015	127	25	10	70	50	60	342	1,279
2016	149	25	10	80	30	60	354	1,633
2017	166	30	10	90	30	50	376	2,009
2018	179	30	10	100	20	40	379	2,388
2019	193	30	10	100	20	30	383	2,771
2020	203	25	10	100	10	20	368	3,139

Among these four types of sources; solar PV, small hydro, biogas and biomass, residential homes would benefit most from solar PV as a renewable energy source. The other three sources would be more suitable for implementation by businesses as the capital expenditure could amount to millions (Ling, 2011). Table 3 demonstrates the different costs involved in setting up different sources.

TABLE 3 RE INSTALLATION COST, (Ling, 2011)

	Solar PV	Small Hydro	Biomass	Biogas
<b>Installed capacity</b>	6 kW	10 MW	10 MW	4 MW
<b>Expenditure</b>	RM 90,000	RM 90 mill.	RM 90 mill.	RM 40 mill.

Even though solar PV would be more beneficial to the residents; the FiT application for solar PV technology is limited to maximum capacity of 5 MWp only. This limit was created by SEDA Malaysia due to consideration of the amount of money in RE Fund.

#### FiT Move Towards RE

Implementation of FiT mechanism will help to increase the RE utilization to replace fossil fuels in energy generation. This is because the mechanism enables the electricity generated from RE to be sold to the utility company and will be able to increase RE from less than 1% in 2009 to 5.5% in 2015 and up to 11% in 2020 (Haris, 2010). Figure 4 shows planned increase in RE capacity with implementation of FiT mechanism.

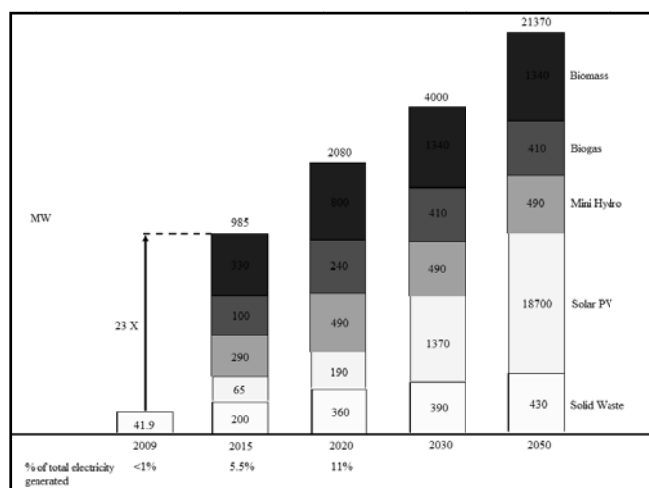


FIG. 4 SHOWS PROJECTION OF CUMULATIVE RE CAPACITY WITH IMPLEMENTATION OF FiT MECHANISM (HARIS, 2010 AND WEINEE, 2010)

Implementation of FiT mechanism will increase the RE investments. The increases of RE utilization in energy generation will provide an annual CO<sub>2</sub> avoidance of 3.2 million tone (Haris, 2010). Furthermore, if the RE

capacity is to be increased from 2,080 MW to 4,000 MW, it is estimated that the country can avoid 42 million tons of CO<sub>2</sub> in 2020 and 145 million tons of CO<sub>2</sub> in 2030 respectively (Weinee, 2010).

#### FiT's Benefits

FiT financing concept is based on polluter's pay concept that gives benefit to those economizes in energy consumption where consumer that uses high energy should contribute to RE Fund. Based on FiT concept, FiT mechanism is obviously not a government subsidy to those generating RE but a cost routing mechanism used widely in most country.

Clearly, FiT has two functions, as environment conservation through money reward given would spur greater RE development and increase RE generation. Apart from that, FiT also encourages savings in electricity usage through 1% contribution concept to users of electricity exceeding 300 kWj. This strategy would help the country to reduce dependency on fossil fuel in energy generation and assist countries bound towards sustainable future.

#### Conclusion

Implementation of FiT mechanism has proven effective in encouraging RE industry market under the RE Act 2011 under which, the distribution licensee is compelled to accept all of electricity generated by feed-in approval holder. Due to this, FiT is regarded as an incentive afforded to give high return of investment and guaranteed under a contract. Hence, implementation of FiT mechanism under RE law will be able to create stable condition to RE market for long run. With implementation of FiT mechanism, energy can be produced with small scale technologies and able to provide opportunities to public to generate clean energy. Indirectly, carbon emissions and pollution in the country could be reduced. Currently, FiT mechanism in Malaysia is used in all states except in Sarawak due to the different practise of law to manage electricity supply. With FiT implementation, government's target on the acquisition of green energy (985 MW in 2015) should be obtainable with the increase of more renewable energy projects.

#### ACKNOWLEDGEMENT

The authors wish to acknowledge the Universiti Teknologi Malaysia.

## REFERENCES

- Energy Commission. Electricity supply industry in Malaysia, performance and statistical information 2009. Malaysia: Putrajaya, 2010.
- Haris, A. H. Ir. "Renewable energy and feed-in-tariff. RE/MBIPV in National Project Team." Ministry of Energy, Water and Communications, December 29, 2010.
- Haris, A. H. Ir. "Renewable energy bill & subsidiary legislations." RE/MBIPV in National Project Team, Ministry of Energy, Water and Communications, April 21, 2011.
- H. Fayaz, N.A. Rahim, R. Saidur, K. H. Solangi, H. Niaz and M.S. Hossain. "Solar energy policy: Malaysia vs developed countries." IEEE First Conference on Clean Energy and Technology CET, 2011. Malaysia: Kuala Lumpur, June 28 – 29, 2011. p. 374-378.
- KeTTHA (Ministry of Energy, Green Technology and Water, Malaysia). "Feed-in-tariff." Accessed December 1, 2011. <http://www.seda.gov.my>.
- K.H. Solangi, T.N.W. Lwin, N.A. Rahim, M.S. Hossain, R. Saidur and H. Fayaz. "Development of solar energy and present policies in Malaysia." IEEE First Conference on Clean Energy and Technology CET, 2011. Malaysia: Kuala Lumpur, June 28 – 29, 2011. p. 115 – 120.
- Law of Malaysia. "Act 725: Renewable energy act 2011." Government of Malaysia.
- Lim C.H., Elias S. and Philip J. "Renewable energy policy and initiatives in Malaysia." *AlamCipta, International Journal on Sustainable Tropical Design Research & Practice* 1(1) (2006): 33-40.
- Ling, G. P. "Going solar and renewable, MBIPV project." Accessed May 1, 2011. <http://www.mbipv.net.my/news1/2011/April/Going%20solar%20and%20renewable%2018th%20April%202011.pdf>.
- Paul Gipe. "Malaysia adopts sophisticated system of feed-in-tariffs, MBIPV project." Accessed May 1, 2011. <http://www.mbipv.net.my/news1/2011/April/Malaysia%20Adopts%20Sophisticated%20System%20of%20Feed%20in%20Tariffs%2028th%20April%202011.pdf>.
- T. H. Oh, S. Y. Pang and S.C. Chua. "Energy policy and alternative energy in Malaysia: Issues and challenges for sustainable growth." *Renewable and Sustainable Energy Reviews* 14 (4) (2010): 1241–1252.
- S. C. Chua, T. H. Oh and W. W. Goh. "Feed-in-tariff outlook in Malaysia." *Renewable and Sustainable Energy Reviews* 15 (1) (2011): 705-712.
- Weinee, C. "Solar photovoltaic: plug into the sun." MBIPV project in Malaysia Energy Guide, 2010.